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4.1 FACILITY AVAILABILITY

The SSU6 Project will employ a single multi case geothermal condensing steam turbine. Generating plants employing geothermal steam turbines operating in continuous service have demonstrated operating availabilities above 95 percent over several years.

4.1.1 Range of Availability

Overall availability varies from year to year because of both random causes and the structure of the overhaul cycle. Forced unavailability changes somewhat from year to year because the numbers and lengths of forced outages vary randomly. Planned outages also vary because the overhaul cycle requires different amounts of down time in different years. The geothermal steam turbine will be overhauled on a 4-year cycle with planned outages in Years 1, 2, and 4 for brine equipment overhaul and various plant upgrades. Brine equipment overhauls and turbine generator overhauls would occur simultaneously, with an additional brine equipment overhaul occurring between these. All of the planned outage work for major overhauls will be performed in the spring season when demand is relatively low. The expected service life of the facility is 30 years.

4.1.2 Basis for Forecasts of Availability

4.1.2.1 Resource Production Facility

Proper performance of the turbine, and of the overall facility, is dependent on the continuous supply of turbine-quality steam. The crystallizer/reactor clarifier process is a proven technology for producing turbine-quality steam and effectively processing the brine. Commercial application employing this technology has been demonstrated in the Salton Sea KGRA, with up to three years between brine system overhauls. Design features that lead to this success are being incorporated in the design of this facility. These include: a proven process design that effectively polishes the steam and removes solids from the brine (thereby mitigating scale formation on facility internals and in the injection wells); use of alloy materials or cladding on vessels and tanks to mitigate corrosion and scale adhesion; equipment sufficiently sized to ensure performance; and use of redundant and standby equipment to ensure continued operation of the facility.

Noncondensable gas abatement is handled by two separate units. The first unit is a LO-CAT H₂S abatement system that converts H₂S to sulfur. This technology has been successfully deployed at other geothermal units worldwide. The second unit is a benzene abatement unit employing activated carbon. This unit will be placed in series after the H₂S abatement system. Although the use of carbon filters for benzene abatement in a geothermal application is new, it is successfully used in refineries for air stripping pond water. Additionally, recent pilot tests at the Salton Sea KGRA facility have shown this technology effectively abates benzene in geothermal noncondensable process streams.

Although the crystallizer/reactor clarifier process effectively reduces solids in the brine, periodic workovers of the injection wells will nonetheless be required. This is considered normal maintenance practice, and the workovers maintain the injectivity required to ensure long-term operation of the RPF.

4.1.2.2 Power Generation Facility

The risk of catastrophic failure for the geothermal condensing turbine is considered small. The design has been proven in the geothermal industry in similar commercial applications worldwide. The turbine manufacturers under consideration are reputable, and a review of turbines in geothermal service shows that catastrophic failures are extremely uncommon. Mitigation against failure or damage is achieved by proper design, operation, and maintenance, and by the incorporation of a spare rotor and stationary blades in the spare parts purchased with the machine.

Components of the heat rejection system, including the shell-and-tube type main condenser, the three-stage ejector/vacuum pump gas removal system, and the counter flow cooling tower have performed very reliably in geothermal applications like this over many years.

4.1.2.3 Degradation in Output from Fouling and Wear

All steam turbines degrade in output from their new and clean condition because of fouling and wear. “Nonrecoverable” degradation from equipment wear increases rapidly in the first few thousand hours and then slows. Most of the degradation resulting from wear will be recovered during the major overhaul conducted at the end of 4 years.

4.1.2.4 Summary of Availability

The SSU6 Project is expected to provide a high availability and be responsive to the needs of the system for power. Outages are expected to occur every two years for the RPF and every four years for the PGF. Planned outages would occur in the spring.

4.2 RELIABILITY

Critical functions and parameters will have redundant sensors, controls, indicators, and alarms. The system will be designed such that critical controls and indications do not fail because of a failure in the control system implementation of redundancy logic.

Control systems in general, and especially the protection systems, will be designed according to stringent failure criteria.

Measurement redundancy will be provided for all critical plant parameters. DCS microprocessors will be fully redundant with automatic tracking and switchover capability in case of primary microprocessor failure. Two fully redundant data communications networks will be provided. The system will permit either network to be disconnected and reconnected while the system remains online and in control. The control system will incorporate online self-diagnostic features to verify proper operation of system hardware, software, and related support functions such as control power, field contact interrogating power, and the system modules in position.

The following subsections identify equipment redundancy as it applies to project availability.

4.2.1 Resource Production Facility

The standard and low-pressure crystallizer trains are redundant. If problems occur with one of the trains, it can be isolated so that operation of the plant can be maintained with the other trains.

Each of the four trains will be oversized by 33 percent. Each pair of crystallizer trains will feed into its own primary and secondary clarifier train (brine), and scrubber and demister train (steam). The clarifiers, scrubbers, and demisters will be individually sized for 67 percent of total facility brine/steam flow (i.e., each clarifier, scrubber, and demister is oversized by 33 percent), so full plant output can be maintained when one of the crystallizer trains is taken out of service.

Enough wells will be drilled to provide production and injection capacity so that full plant output can be maintained while wells are being individually worked over.

4.2.2 Power Generation Facility

The turbine generator system includes an excitation system, lube oil system, and steam turbine control and instrumentation. Redundancy is provided in the steam turbine subsystems where practical. For example, the lube oil system consists of redundant pumps, filters, and coolers. The microprocessor based control system consists of redundant microprocessors, as well as redundant sensors for critical measurements. Technological advancements, as well as redundancy as illustrated above, have led to extremely high reliability for the steam turbines considered for this project.

The power generation facility includes multiple circulating water pumps with standby capacity at each cooling tower. The four 33 percent parallel ejector trains featured in the gas removal system allows one train to be isolated for maintenance while maintaining plant operation at full capacity with the other three trains. A standby hotwell pump is also included.

4.2.3 Balance of Plant Systems

Balance of plant systems serve to enhance reliability. An instrument air system is incorporated in the design. The plant instrument air system provides a compressed, dry air for use in instruments and control devices. The system consists of one 100 percent capacity electric-driven air compressor, one air dryer with pre-filter and after-filter, an air receiver, instrument air headers, and distribution piping. A standby air compressor and standby ancillary equipment (regenerative air drier, receiver, and instrumentation) will also be provided for added reliability. The fire water system includes a back-up diesel-powered pump. A standby pump is included for the auxiliary cooling water system.

4.2.4 Distributed Control System

The distributed control system (DCS) will be a redundant microprocessor-based system that will provide control, monitoring, and alarm functions for plant systems and equipment. The following functions will be provided:

- Control the resource production facility and other systems in response to unit load demands (the steam turbine-generator has its own control system).
- Provide control room operator interface.
- Monitor plant equipment and process parameters and provide this information to the plant operators in a meaningful format.
- Provide visual and audible alarms for abnormal events based on field signals or software-generated signals from plant systems, processes, or equipment.

The DCS will have functionally distributed architecture comprising a group of similar redundant processing units linked to a group of operator consoles and an engineering workstation by redundant data highways. Redundant processors will be identically programmed to perform the specific tasks for control information, data acquisition, annunciation, and historical purposes. Because of this redundancy, no single processor failure can cause or prevent a unit trip.

4.2.5 Power Plant Performance and Efficiency

Based on predicted power dispatching, the SSU6 Project is expected to produce over 8,000 hours per year. Under summer design conditions, the corresponding brine production rate will be approximately 12,815 kph.

4.2.6 Fuel/Water Availability

The wellfield for the SSU6 Project is in an area that offsets known production areas that are highly productive and has test wells on the other side of the development area. This produces extremely good control to classify the entire SSU6 production wellfield as proven production. The only resource risk in this area is interference with the existing production wells, which has been minimized by well placement based on the use of simulation runs during resource computer modeling. Redrills will be performed as required to maintain production, and use of pressure observation wells and ongoing wellfield simulation will be employed to manage the resource.

The source of water for the plant will be water from agricultural distribution canals. The water custody transfer point will be at the existing Vail 4A lateral, water gate 460, located at the southeast corner of the facility (the IID is responsible for the operation and maintenance of the water supply system upstream of this point). This gate is within 500 feet of the service water pond. As this IID supply system is already in place, upgrades to the existing water supply system are expected to be minor. A buried pipeline will be installed to transfer the water by gravity from the custody transfer point to the water pond.

4.2.7 Project Quality and Control

This section summarizes the quality assurance and control program for the SSU6 Project. The objective of the quality control program is to ensure that all systems and components have the appropriate quality measures applied (during design, procurement, fabrication, construction, and operation) to achieve safety, reliability, availability, operability, contractibility, and maintainability for the generation of electricity. The quality program will be administered by a contractor qualified to the ISO 9000 criteria.

The required quality for a system is ensured by applying controls to various activities, depending on the activity being performed. For example, the appropriate controls for design work are checking and review, and the appropriate controls for manufacturing and construction are inspection and testing. Appropriate controls will be applied to each of the various activities for the project.

4.2.7.1 Quality Assurance

The Engineering, Procurement, and Construction contractor (EPC) will develop a quality control plan with input from the owner and major equipment suppliers. This will include a detailed

responsibility matrix, specifications, equipment lists, procurement plans, project control systems, logistics plans, and the project execution programs. The EPC contractor and the owner's engineer will work closely together during the project to maximize constructability and efficiency, accelerate approvals, and ensure that the project conforms to all permit requirements.

For quality assurance planning purposes, the project activities have been divided into nine stages that apply to specific periods during the project. As the project progresses, the design, procurement, fabrication, erection, and checkout of each plant system proceeds through these stages.

The project stages are defined as follows:

- Conceptual Design Criteria – Activities such as the definition of requirements and engineering analyses
- Detailed Design – Activities such as the preparation of calculations, drawings, and lists needed to describe, illustrate, or define systems, structures, or components of the power plant
- Procurement Specification Preparation – Activities necessary to compile and document the contractual, technical, and quality provisions for procurement specifications for plant systems, components, or services
- Manufacturers' Control and Surveillance – Activities necessary to ensure that the manufacturers conform to the provisions of the procurement specifications
- Manufacturer Data Review – Activities required to review manufacturers' drawings, data, instructions, procedures, plans, and other documents to ensure coordination of plant systems and components, and conformance to procurement specifications
- Receipt Inspection – Inspection and review of product at the time of delivery to the construction site
- Construction/Installation – Inspection and review of storage, installation, cleaning, and initial testing of systems or components at the plant site
- System/Component Testing – Actual operation of plant components in a system in a controlled manner to ensure that the performance of systems and components conform to specified requirements
- Plant Operation – The actual operation of the plant system

4.2.7.2 Quality Control Records

The following quality control records will be maintained for review and reference:

- Project Instruction Manual
- Design Calculations
- Project Design Manual
- Quality Assurance Audit Reports
- Piping and Instrument Diagrams
- One-Line and Three-Line Diagrams
- Conformance to Construction Records Drawings

- Procurement Specifications (Contract Issue and Change Orders)
- Purchase Orders and Change Orders
- Manufacturers' Quality Assurance Program Manuals
- Construction Test Records
- Historical Operating and Maintenance Data

For procured component purchase orders, a list of qualified suppliers would be developed. Before contracts are awarded, supplier capabilities are evaluated. The evaluation considers the supplier's personnel, production capability, past performance, and quality assurance program.

Supplier quality-assurance capabilities are reviewed, with special consideration given to the program description and implementing procedures and review of the suppliers' quality performance history. Before contracts are awarded, the suppliers' facilities may be surveyed to verify that their quality assurance program is effective and applicable to the materials, equipment, and services supplied.

Each procured component has adequate contractual requirements to ensure quality assurance. During construction, field activities are accomplished during the last four stages of the project: receipt inspection, construction/installation, system/component testing, and plant operations. Suppliers will be contractually responsible for performing the work in accordance with the quality requirements specified by contract.

Quality compliance will be surveyed through inspections, audits, and administration of independent testing contracts.

At the beginning of the project, the EPC contractor will prepare written plans for project execution. Among other things, these plans will include a project schedule, and will describe implementation of the project and interface between the various EPC activities. The detailed engineering plans will be developed in stages, as required, and will be in accordance with the CEC's Certificate of Condition (COC), but well in advance of the installations covered by the individual plans.

A project-specific plan will be developed to specify worker safety procedures and the Applicant and EPC Contractor responsibilities to minimize the occurrence of incidents involving personnel on site. The documentation will address loss-control actions required during the design, procurement, and construction phases of the work. Actions necessary to minimize the impact of the work on the surrounding area will also be addressed.

The Applicant will implement a maintenance program specific to the needs of the facility, as outlined in the following section.

4.2.8 Operations Maintenance Plan

4.2.8.1 General Approach

During the operations phase, the operator will perform all tasks necessary to operate and maintain the plant in accordance with an Operating Plan, approved procedures, and prudent, industry standards, including:

- Operations Management
 - Schedules, Shift Routines, Manloadings

- Plant Operations and Supervision
- Ongoing Operations Training
- Maintenance Management
 - Preventive Maintenance
 - Predictive Maintenance
 - Corrective Maintenance
 - Outage Management
 - Spare Parts Inventory Control
- Administrative Support
 - Administrative Planning
 - Computer Systems and Communications
 - Budget and Accounting Controls
 - Records Management
 - Plant Safety Program
 - Plant Security

Each of these are described as follows:

4.2.8.1.1 Operations Management

Effective operations management provides the planning, scheduling, and training necessary for efficient and profitable plant operation.

Staffing

Staffing plans are designed for the ongoing operational and maintenance requirements of the facility. All periodic testing, inspections and maintenance activities will be identified as well as those operational and maintenance requirements that require specialized and extra assistance at specific times during the maintenance cycle of the plant.

The staffing plan includes a permanent plant staff that will be fully responsive to all electrical load demands and will be responsible for the performance of all preventive maintenance and routine repairs.

The onsite operations and maintenance staff will be supported for non-routine functions by the home office, the EPCs, and subcontractors. Associated technical and specialized vendor support will be subcontracted as needed during planned outages, inspections and overhauls.

Plant Operations and Supervision

The Operational Plan will require the following:

1. Operate the facility in accordance with the Operating Plan, O&M Manual, all applicable laws and permits, and an approved annual budget and prudent industry standards.
2. Perform and record periodic operational checks and tests of equipment in accordance with approved maintenance procedures, the equipment manufacturer's specifications, and applicable laws and regulations.
3. Maintain operating logs, records, and reports for operation of the facility.
4. Coordinate scheduled shutdowns or other modifications in basic plant operations.

Ongoing Operations Training

The Operator will establish, implement, and conduct an ongoing operations training program. The plant staff will continue to receive training to maintain or improve plant reliability, availability and capacity following project startup.

Manufacturers' representatives and other sources of operations, maintenance, and overhaul literature will provide up-to-date information and techniques to the plant staff. Key staff members will also attend industry conferences and seminars to exchange information with other operators.

4.2.8.1.2 Maintenance Management Program

The project will use a computerized maintenance/inventory management (CMIM) system.

The key elements of the Project's maintenance/inventory systems will include:

- Preventive maintenance
- Predictive maintenance
- Corrective maintenance
- Outage management
- Spare parts inventory control.

The control system will use a computerized maintenance management program to provide plant personnel with equipment histories, work orders, maintenance schedules, outage scheduling, inventory control, and equipment and man-hour costs.

Preventive Maintenance

Project preventive maintenance will consist of periodic equipment inspections and adjustments that will help avoid deterioration of plant performance. Preventive maintenance schedules will be included in the computerized plant monitoring program and will be calibrated to an overall plant schedule. This schedule will provide daily, weekly, monthly, and annual scheduling of necessary preventive maintenance activities and will include spare parts management.

Preventive maintenance schedules will be developed for particular pieces of equipment. The preventive maintenance schedules will be updated to reflect actual plant operating conditions, with adjustments made based on changes in key plant parameters. The equipment testing and

monitoring will provide key data for the predictive maintenance component of the overall maintenance management program.

An integrated work order system will be used to schedule work and integrate the preventive maintenance into the overall maintenance management program.

Predictive Maintenance

Predictive maintenance generally improves the reliability/cost ratio and, subsequently, increases plant profitability by monitoring, recording, and evaluating plant performance systematically to develop a documented equipment and plant history. This history allows maintenance scheduling around critical plant components in the plant system. Sensitive areas will receive extra attention from preventive maintenance personnel.

Corrective Maintenance

Corrective maintenance activities will return the equipment quickly to operating order. At regular discussion meetings, plant maintenance personnel will review and evaluate failures to avoid repeat failures. Review of the events preceding the failure allows determination of the exact causes; these findings will be fed back into the predictive maintenance model to determine whether additional or different maintenance procedures are warranted for the key components responsible for the failure.

Outage Management

Outages for overhaul will be managed to minimize downtime through advanced planning, work packages, outage schedules, and other project management methods to allocate plant resources efficiently. Prior to each outage the plant staff and the equipment manufacturers will conduct planned inspections beginning from three months to a year before the outage, depending on the need for and availability of major equipment components. Plant staff will work with vendor representatives to verify that the proper parts and tools are available, help coordinate inspections, and schedule work to be performed in the vendor repair shop.

A scheduling program using the critical path method (CPM) will itemize various work packages, organize them, and calculate the affect any work package has on the overall outage length. The program will provide a reporting tool that allows the plant staff to create easy-to-understand outage schedules and reports showing manpower needs, equipment resources, and usage profiles. The program will also identify potential problems that could lead to schedule slippage.

Spare Parts Inventory Control

The Operator will implement a spare parts inventory control system. Through a combination of selective onsite spares inventory and offsite spare parts tracking, the Operator will provide a controlled system of inventory reporting and record keeping to ensure high plant reliability and availability.

The plant staff will maintain an adequate spare parts inventory. The spares inventory will be managed so that parts are replaced when used, maintenance records are kept current, and the inventory is updated regularly to reflect changing plant requirements.

Prior to outages and inspections, the plant staff will order parts prone to normal wear and tear that are identified as needing to be replaced through the preventive/predictive maintenance programs.

4.2.8.1.3 Administrative Support

Planning, Communications, and Accounting

General

The Operator will develop and implement a comprehensive and specific administrative plan that will:

1. Maintain an effective facility work force through proper hiring, training, administration, and compensation.
2. Replace spare parts for those taken out of inventory with either an identical part or a replacement part.
3. Maintain accurate facility accounting records.
4. Perform annual financial audits.
5. Provide office services.
6. Maintain facility drawings, procedures, instruction books, and manuals.
7. Communicate with fuel suppliers or transporters and host utilities.
8. Procure consumable materials and chemicals, office supplies and services.
9. Submit monthly progress reports summarizing all production results and operations and maintenance activities at the facility.

Plant Documentation

The Operator will prepare and periodically update O&M Manuals, which will include handbooks, procedures, and administrative systems as necessary for effective operation.

Plant Safety Program

To ensure the safety of all employees and personnel working in or near the plant, the Operator will establish a safety plan that conforms to federal, state, and local regulations. Key components of the plan will include:

- **Plant Familiarity:** Employees are to be thoroughly familiar with project operations and procedures, as well as the equipment being operated.
- **Clearances:** Written clearance procedures will be followed before working on or entering any equipment. No employee will work on any equipment that has been cleared for work unless the employee holds a clearance, or is reporting to another employee who holds such clearance.
- **Proper Equipment Designation:** Equipment to be operated or worked on will be properly designated, by name and number.

- Responsibility: Operations and duties are performed only by duly authorized employees, who are held responsible for their actions.
- Monitoring: Employees will be required to maintain a continuing check on operating conditions to prevent a potential hazard to personnel and equipment. These include items such as: high or low oil or water level, excessive temperatures and pressures, overspeeding of rotating equipment, abnormal noises, unusual vibration, malfunctioning of auxiliaries.
- Records: Employees who are required to keep logs and records will keep them current and maintain a high level of accuracy. Abnormal or special conditions will be called promptly to the attention of the proper supervisors and logged. Shift employees will familiarize themselves with all activities within their jurisdiction that have taken place during the preceding shift.

Plant Security

The Operator will develop and implement a formal, written plant security plan and plant staff will be trained in its requirements. Plant staff and all visitors will be required to adhere to the plan to ensure power plant security under all conditions.

4.3 SAFETY

4.3.1 Power Plant

4.3.1.1 Seismic

The facility is situated within the south-central portion of the Salton Trough, a topographic and structural depression bound to the north by the Coachella Valley and to the south by the Gulf of California. The primary geologic hazards at the site include strong ground motion from a seismic event centered on one of several nearby active faults. The site is within the Brawley Seismic Zone, which is a zone of transition between the northwest end of the Imperial fault and the southwest end of the San Andreas Fault. The potential for ground rupture resulting from faulting is believed to be low. Potential impacts of the geologic hazards on the plant and ancillary facility operations include liquefaction, seismic shaking, post-liquefaction settlement, seismically induced flooding, settlement, and subsidence. With implementation of the measures outlined in Section 5.2.4, impacts to plant operations from geologic hazards will be reduced to a less than significant level.

Design and construction of the generating plant will be in conformance with the current California Building Code Seismic Zone 4 requirements. The structural seismic engineering design criterion to be used for the project is included in Appendix B.

4.3.1.2 Flooding

The facility is adjacent to the Salton Sea and is therefore in the special flood hazard area as defined by Imperial County, Title 9, Land Use Ordinance # 1203, Division 16. To mitigate the flood hazard a berm will be constructed around the entire generating facility with a top of berm elevation of -219.5 feet. The proposed location of the facility currently has existing berms on the west and north boundaries. These existing berms will be modified to bring their top of berm elevation to -219.5 feet. A new berm will be constructed on the east and south boundaries.

During the construction phase of the project, erosion and sediment control measures will be temporarily installed as required under the project's NPDES General Permit for Stormwater discharge associated with construction activity. The permanent stormwater management system will consist of ditches/swales in general areas and culverts under roadways draining to an unlined stormwater detention pond. These measures will minimize the possibility of appreciable erosion and resulting sedimentation occurring on the site.

The drainage plan for the plant site will be designed to prevent flooding of permanent facilities by a 100-year, 24-hour storm event. Drainage design will be designed in accordance with Imperial County requirements.

4.3.2 Pipeline Safety

The production and injection pipelines would have several design and operation features related to assuring the safety and reliability of these system components. The design features are described in Section 3.4.2. During commissioning of the pipeline, plant startups, and following work on the production wells, great care is taken to ensure gradual heat-up and controlled thermal expansion of the pipelines. Operational procedures would be used to control the warmup rate of the pipelines to 50 degrees F per hour. The warmup system includes regulation valves that control flow. Steam and brine are re-circulated from the plant back to the production well, slowly warming and pressurizing the pipeline prior to placing the well in service.

Pipelines would be inspected regularly to monitor for leakage. Plant operators would drive the pipeline routes approximately three times per day and visually inspect the pipelines for leaks (the pipelines are installed on supports 2 to 3 feet above grade for inspection purposes). Additionally, the site staff includes a non-destructive examination group that inspects pipelines semiannually in accordance with a preventive maintenance program and schedule. During each inspection, 100 percent of the pipeline welds would be inspected using ultra-sonic equipment. Based on weld inspection results, a random ultra-sonic inspection is conducted along the length of the pipe. Finally, during shutdown maintenance periods, sections of the pipelines would be disassembled for inspection of the concrete liner. The pipelines are joined with bolted flanges at intervals of approximately 320 feet (8 pipe lengths) for this purpose.

Each production well would be equipped with two parallel electrically operated isolation valves. The valves are powered and wired to the plant control room. These valves are stroked shut and open regularly to remove accumulated scale and ensure the valves will operate when required. If a leak in the pipeline is detected, the plant operator can shut these valves remotely in one to two minutes. The pipeline would also be equipped with isolation valves at the plant site that will be shut by operational staff in case of a leak.

A brine release to the ground of 200 to 400 gallons would typically remain within a 20- to 30-foot radius of the leak location. Cleanup involves removing all soil and gravel that has been in contact with geothermal brine. The cleanup is verified by soils sampling after the contaminated material is removed. The material removed would likely be non-hazardous and disposed of in accordance with applicable regulations.

4.3.3 Safety Precautions and Emergency Systems

Safety precautions and emergency systems will be included in the design and construction of the SSU6 Project to ensure safe and reliable operation of project facilities. Monitoring systems and a well-planned maintenance program will enhance safety and reliability.

Safety, auxiliary, and emergency systems consist of required lighting, battery backup for controls, fire and hazardous materials safety systems, steam utilities, and chemical safety systems. The plant will include its own utilities and services such as plant air, instrument air, fire-suppression water, and potable water.

4.3.3.1 Safety Precautions

4.3.3.1.1 Worker Safety

Programs will be in place to assure, at a minimum, compliance with federal and state occupational safety and health program requirements. In addition to compliance with these programs, ongoing implementation of a program that effectively self-assesses potential hazards and mitigates them routinely will minimize the project's effects on employee safety.

4.3.3.1.2 Hazardous Materials Handling

Hazardous materials will be stored and used during construction and operation. Design and construction of hazardous materials storage and dispensing systems will be in accordance with applicable codes, regulations, and standards. Hazardous materials storage areas will be curbed or bermed to contain spills or leaks. Potential hazards associated with hazardous materials will be further mitigated by implementing a hazard communication program and thorough training of employees, including proper handling and emergency response to spills or accidental releases. Emergency eyewashes and showers will be provided at appropriate locations. Appropriate personal protective equipment (PPE) will also be provided.

4.3.3.1.3 Security

Operating staff will provide security, as they make their normal operating rounds. The facility will be staffed 24 hours per day. At each well pad, the high temperature well head valve area (commonly called the cellar) will be fenced. Firefighters and police will have access to the facility at all times. Additionally, the substation and transformer area will be fenced and provided with access gates.

4.3.3.1.4 Public Health and Safety

The programs implemented to protect worker health and safety will also benefit public health and safety. Facility design will include controls and monitoring systems to minimize the potential for upset conditions that may result in public exposure to hazardous materials. Potential public health impacts associated with operation of the SSU6 Project will be mitigated by development and implementation of an Emergency Response Plan, an employee hazards communication program, a Spill Prevention Control Plan, safety programs, and employee training. Coordination will be made with local emergency responders by providing them with copies of the plant site Emergency

Response Plan, conducting plant site tours to point out the location of hazardous materials and safety equipment, and encouraging these providers to participate in annual emergency response drills.

4.3.3.2 Auxiliary Systems

The SSU6 Project will include centralized control and monitoring systems that will help ensure safe operation of the project facilities. Refer to Section 3.8 and Appendix D for more information.

4.3.3.3 Emergency Systems

4.3.3.3.1 Fire Protection Systems

The SSU6 Project will have onsite fire protection systems and will be supported by local fire protection services. Portable and fixed fire suppression equipment and systems will be included in the SSU6 Project. Portable fire extinguishers will be located at strategic locations throughout the SSU6 Project site. Smoke detectors, sprinkler systems, and fire hydrants with hoses will be used.

Employees will be provided fire safety training, including instruction in fire prevention, use of portable fire extinguishers, and reporting fires to the local fire department. Employees will only suppress fires in an incipient stage. Fire drills will be conducted at least twice each year for each work area.

The Calipatria station in Calipatria will provide the primary fire protection, inspections, and fire fighting services for the SSU6 Project.

The Imperial County Fire Chief will perform a final fire safety inspection upon completion of construction and, thereafter, will conduct fire safety inspections. It is expected that prior to startup, the County Fire Chief will visit the SSU6 Project site to become familiar with the site and with the plant's emergency response procedures.

4.3.3.3.2 Medical Services and Emergency Response

The SSU6 Project will have an Emergency Response Plan. The Emergency Response Plan will address potential emergencies, including chemical releases, fires, and injuries, and will describe emergency response equipment and its location, evacuation routes, reporting to local emergency response agencies, responsibilities for emergency response, and other actions to be taken in case of an emergency.

Employee response to an emergency will be limited to the awareness and first responder levels to minimize the risk of escalation of the accident or injury. Training consistent with these response levels will be provided to employees. A first-aid station with adequate first aid supplies and personnel qualified in first aid treatment will be provided on site.

Calipatria Fire Station has the primary responsibility for dispatching emergency medical technicians (EMT). Backup EMT units are available from Niland. They will respond to medical emergencies at the plant based on availability. Ambulances will be dispatched from Imperial by the Calipatria emergency response team. The nearest hospital is in Imperial; however, burn patients would be transported to the UCSD burn center via helicopter.

4.3.3.4 Aviation Safety – Power Generation Stacks

The closest airport to the project site is approximately 6 miles southeast in Calipatria. This airport is classified as an airstrip. Currently the only traffic allowed at this field is crop dusters and light private planes. There is no runway lighting, refueling, or control tower service.

Commercial air flights in the region are handled by Imperial County Airport. All commercial traffic is routed southeast of the project by approximately 20 miles. The Applicant and IID will consult with the Airport Land Use Commission.

4.3.4 Transmission Line Safety**4.3.4.1 Audible Noise and Radio and TV Interference**

An electric field is generated in the air surrounding a transmission line conductor when the transmission line is in operation. A corona discharge occurs at the conductor surface when the intensity of the electric field at the conductor surface exceeds the breakdown strength of the surrounding air. The electrical energy released from the conductors during this process is known as corona loss and is manifested as audible noise and radio/television interference.

Energized electric transmission lines can also generate audible noise by a process called corona discharge, most often perceived as a buzz or hum. This condition is usually worse when the conductors are wet. The Electric Power Research Institute (EPRI) has conducted several transmission line tests and studies that measured sound levels for several power line sizes with wet conductors (Transmission Line Reference Book, 345 kV and Above, EPRI, 1975,1982). The Transmission Line Reference Book, 345 kV and Above also notes that the noise produced by a conductor attenuates (decreases) by 2 to 3 decibels (dB) for each doubling of the distance from the source.

Radio and TV interference, known as gap-type noise, is caused by a film on the surface of two hardware pieces that are in contact. The film acts as an insulator between the surfaces. This results in small electric arcs that produce noise and interference. This type of noise is not a problem in well-maintained transmission lines.

There are many factors contributing to the pre-project ambient noise levels in the plant area. The project transmission line will be designed such that noise from the line will continue to be well below undesirable levels. Any noise or radio/TV interference complaints will be logged, investigated, and, to the degree possible, mitigated.

4.3.4.2 Induced Currents and Hazardous Shocks**4.3.4.2.1 Induction**

Touching metallic objects near a transmission line can cause hazardous or nuisance shocks if the line is improperly constructed. Because the electric fields of the transmission line are negligible above ground, and the line would be built consistent with California Public Utility Commission GO 95 requirements and Title 8 CCR 2700 requirements, hazardous shocks are highly unlikely to occur as a result of the project construction and operation.

4.3.4.3 Electric and Magnetic Fields (EMF)

EMF occur independently of one another as electric and magnetic fields at the 60-Hz frequency used in transmission lines, and both are created by electric charges. Electric fields exist when these charges are not moving. Magnetic fields are created when the electric charges are moving. The magnitude of both electric and magnetic fields fall off rapidly as the distance from the source increases (proportional to the inverse of the square of distance). Power lines, electrical wiring, electrical machinery, and appliances produce EMFs.

Transmission lines generate electric fields because of unbalanced electrical charge on unshielded energized conductors. Electric field strengths are expressed in volts per meter (V/m) or kilovolts (thousands of volts) per meter (kV/m). Once electric currents are in motion, they create magnetic fields. The strength of the magnetic field is proportional to the magnitude of the current in the circuit. Magnetic fields can be characterized by the force they exert on a moving charge or on an electrical current. A magnetic field is a vector quantity that is characterized by both magnitude and direction. Electric currents are sources of magnetic fields. Magnetic field strengths are measured in milligauss.

In January 1991, the CPUC issued an Order Instituting Investigation (I.91-01-012, CPUC 1991) into the potential health effects from electric and magnetic fields emitted by electric power and cellular telephone facilities. In September 1991, the assigned CPUC Administrative Law judge issued a ruling that created the “California EMF Consensus Group.” This group of representatives forms utilities, industry, government, private and public research, and labor organizations submitted a document titled “Issues and Recommendations for Interim Response and Policy Regarding Power Frequency EMFs” on March 20, 1992 (California EMF Consensus Group 1992). Regarding the relevant policy consensus recommendation titled “Facility Siting,” the group stated that the CPUC should recommend that utilities take public concern about electromagnetic fields into account when siting new electric facilities. Although this group could not conclude that there is a relationship between EMF and human health effects, they also could not conclude that this relationship does not exist to any extent; therefore, they recommended that the CPUC authorize further research.

California does not currently have a regulatory level for magnetic fields. However, the values estimated for the project are well below those established by states that do have limits. Other states have established regulations for magnetic fields strengths that have limits ranging from 150 to 250 mG at the edge of the ROW, depending on voltage. The CEC does not currently specify limits.

4.3.4.3.1 Calculation Methods

The EMF effects were calculated at multiple points within the ROW of each transmission configuration using EPRI’s ENVIRO Workstation – an industry benchmark. Five transmission line configurations that would be installed as part of the SSU6 project were evaluated (See Appendix L).

All calculations were performed at midspan locations (i.e., points of greatest line sag), 1 meter above ground level, based on the line geometries, conductor type, phasing, nominal voltage, and maximum expected current loading.

4.3.4.3.2 Line Loads for EMF Calculation

Maximum line loads for each transmission line configuration were used to determine EMF values. Maximum current flow in the 161 kV line ranged from 120 A to 780 A. Maximum

current flow in the 92 kV line ranged from 440 kV to 729 kV. These line loading values were used as inputs to the ENVIRO Workstation model.

4.3.4.4 *Magnetic Fields Along the Rights-of-Way*

The maximum magnetic field strength along the ROW is 19.8 mG and occurs only in the fifth configuration (92kV single-circuit line with underbuild adjacent to 161kV double-circuit line adjacent to 34.5 kV single-circuit).

4.4 APPLICABLE LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Please refer to Appendices A through E for a detailed discussion of applicable LORS engineering design criteria.